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Differences in Song Rate in Two Populations of Yellow Warblers

C. Morgan Wilson[1,2,4] and Rebecca L. Holberton[1,3]

ABSTRACT.—The Yellow Warbler (*Dendroica petechia*) has a mating system characterized by monogamy and biparental care, and has the broadest breeding distribution of any *Dendroica* species. When faced with a short breeding season and unpredictable conditions at high latitude, they display physiological responses to help optimize the tradeoff between individual risk and reproductive success. Because these circumstances may also affect behavior, we measured the song rates (songs/hr) of subArctic- and temperate-breeding males during the nestling period. Temperate males sang at higher rates when compared to subArctic males. Maintaining a high song rate while provisioning nestlings may be advantageous if a second brood is attempted. Our results suggest behavioral plasticity as a result of differing constraints on time and reproduction. *Received 3 April 2006. Accepted 28 August 2006.*

The Yellow Warbler (*Dendroica petechia*) has the broadest breeding distribution of any *Dendroica* species (Dunn and Garrett 1997, Lowther et al. 1999) and occurs in high density over much of its range (Sauer et al. 2001). This species' mating system is characterized by monogamy and biparental care, but extra-pair mating (Yezerinac and Weatherhead 1997, Yezerinac et al. 1999) and polygyny have been documented (Ford 1983, 1996; DellaSala 1986; Reid and Sealy 1986; Spector 1991). Such deviations from the typical mating system may occur mainly at lower latitudes, because the brief northern breeding season enforces increased nesting synchrony and reduces opportunities for extra-pair interactions when compared to more temperate populations (Briskie 1995, Yezerinac et al. 1999).

We earlier demonstrated that males breeding at high latitude display a significantly reduced endocrine response to stress during nestling provisioning (when compared to temperate-breeding males) to help optimize the tradeoff between individual risk and short-term reproductive success (Wilson and Holberton 2004). In the present study, we investigated whether corresponding behavioral plasticity occurs in the time- and energy-demanding behavior of singing. We predicted that subArctic-breeding males would spend less time singing during the nestling period when compared to their temperate counterparts, particularly late in the nestling period, when energetic demands of their growing nestlings are highest. Temperate-breeding males also have demanding nestlings during this stage, but we predicted they would be less constrained by parental care and more likely to continue defending territories and females in preparation for a possible second breeding attempt.

METHODS

We found Yellow Warbler nests along the Churchill River near Churchill, Manitoba (58° 37′ N, 94° 13′ W) in early June 1999, and in areas immediately around Jennings Randolph Lake (JRL; 39° 24′ N, 79° 07′ W) in Garrett County, Maryland and Mineral County, West Virginia in May 2000 and 2001. The male of each nest was captured after the onset of incubation by the female but prior to hatch of the eggs. Birds were marked with a USGS aluminum leg band and a unique combination of colored leg bands. The nestling period was divided *a priori* into early (days 1–3), middle (days 4–6), and late (days 7–9) stages. Each male's song rate (songs/hr) was expressed as the number of songs during focal, 1-hr-long observation periods on days 2, 5, and 8. Observations were conducted between 0500 and 0900 hrs CDT at Churchill and between 0700 and 1100 hrs EDT at JRL (within 1–4 hrs following sunrise at each location). Each color marked male was confirmed as the male of the

[1] Department of Biology, University of Mississippi, University, MS 38677 USA.

[2] Current address: Department of Biology, Hollins University, Roanoke, VA 24020 USA.

[3] Current address: Department of Biological Sciences, University of Maine, Orono, ME 04469 USA.

[4] Corresponding author; e-mail: mwilson@hollins.edu

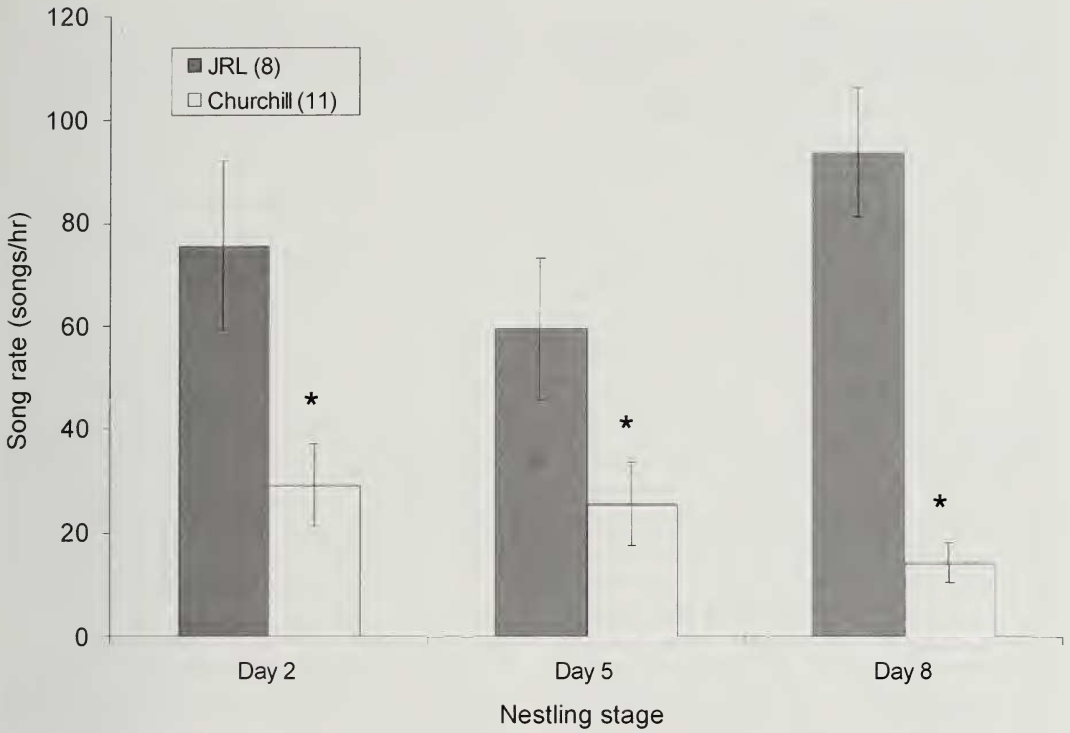

FIG. 1. Song rates of male Yellow Warblers during the nestling period were higher in a temperate study site (JRL; Maryland and West Virginia) than at a subArctic site (near Churchill, Manitoba) and did not change over the nestling period at each site. Sample size shown in parentheses. Bars represent the mean ± SE. An asterisk represents a significant difference (P = 0.01, 0.04, and < 0.001 for days 2, 5, and 8, respectively).

territory by observing him provisioning nestlings.

Seventeen or more nests were found at each study site, but only 11 (Churchill) and 8 (JRL) remained intact throughout the study period. Data were normally distributed and statistical analyses were performed using StatView version 4.51 (Abacus Concepts, Inc., Berkley, CA, USA). A single-factor repeated measures analysis of variance (ANOVA) was used to examine song rate at each site, with nestling stage comprising the repeated measure component. A two-factor repeated measure ANOVA was used to test for differences in song rate between the sites, with nestling stage comprising the repeated measure component. Fisher's protected least significant difference (PLSD) was used for *post hoc* analyses. Breeding density at each site was calculated by dividing the number of nests by the estimated total area of nesting habitat studied, using distinct habitat edges (e.g., water body and forest edges) to define this area.

RESULTS

The breeding density of Yellow Warblers at Churchill was almost three times as high as at JRL (~3.6 vs. ~1.3 pairs/ha). However, JRL males sang at higher ($F_{1,17}$ = 25.28, P < 0.001) rates than did Churchill males overall and at each nestling stage (song rates ± SE on days 2, 5, and 8, respectively: JRL, 75.50 ± 16.51, 59.38 ± 13.82, 93.50 ± 12.47; Churchill, 29.18 ± 7.80, 25.64 ± 8.10, 14.36 ± 3.68; Fig. 1). There was a significant song rate × site interaction ($F_{2,17}$ = 3.64, P = 0.04), but since song rates did not vary across the nestling period at either site (Churchill $F_{2,10}$ = 1.74, P = 0.10; JRL: $F_{2,7}$ = 1.74, P = 0.21; Fig. 1), this interaction may be a statistical artifact.

DISCUSSION

The higher breeding density of Yellow Warblers at Churchill might have been expected to lead to a high rate of singing behavior, but

this was not the case; JRL males sang at much higher rates. The difference between sites may reflect differences in territory size, food availability, and/or other ecological factors, or differences between the subspecies that occur at the sites (*D. p. parkesi* and *D. p. aestiva*, respectively; Browning 1994). However, we suggest the difference may also reflect differences in breeding biology. Under harsh and/or unpredictable conditions, paternal care may be crucial to reproductive success (Bart and Tornes 1989, Lynn and Wingfield 2003). Thus, Churchill males may invest more in parental care and less in singing. Following brood-rearing (median hatch date at Churchill, 27 Jun), males must transition quickly from reproduction to molt to prepare for migration by mid August (Jehl 2004). Therefore, second broods are highly unlikely because of time constraints (Briskie 1995, Dunn and Garret 1997, Jehl 2004). In contrast, while paternal care may also be important to reproductive success in temperate populations, the higher song rate of temperate males may help maintain territories and retain mates if a second brood is attempted. The frequency of second broods in temperate populations of Yellow Warblers remains unclear, as they have been reported as both common (Dunn and Garrett 1997) and rare (Goossen and Sealy 1982). Second brood attempts were not studied at the JRL site. If attempted, the timing of the nesting cycle (median hatch date of 25 May) would likely result in a second clutch in mid to late June. Identifying the factor(s) that influence song rate in these two populations requires further study, but our results suggest behavioral plasticity of males of the same species faced with potentially different constraints on time and reproduction.

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Red-breasted Sapsuckers Nest in Utility Pole

Steven R. Helm[1]

ABSTRACT.—A pair of Red-breasted Sapsuckers (*Sphyrapicus ruber*) was observed nesting in an electric distribution, creosote-treated, wood utility pole in the Willamette Valley, Oregon during spring 2006. To the author's knowledge, this is the first published account of a sapsucker nesting in a utility pole. *Received 5 July 2006. Accepted 4 August 2006.*

A pair of Red-breasted Sapsuckers (*Sphyrapicus ruber*) was observed nesting in an electric distribution, creosote-treated, wood utility pole from 29 May through 4 June 2006 in the Willamette Valley, Clackamas County, Oregon (T2S, R1E, S28). The approximately 12-m tall pole was installed in 1969 and was heavily damaged. The nest hole was at a height of 3.0 m, while four similar sized nest holes and numerous non-nest excavations were evident higher on the pole. On 8 June 2006, an adult was found dead on the pole. The bird's leg had become tangled in fine, black, plastic netting material that was present in the nest cavity. Apparently, the bird could not free itself as it flew from the pole. It is unknown whether the netting was used by the pair as a nest liner or placed by someone to cause nest failure. Nestlings were heard at the time the adult was removed but perished, as the nest was abandoned by the other adult. Red-breasted Sapsuckers had nested in this pole for several consecutive years according to local residents.

The pole was along a lightly traveled road in a semi-rural area and the nest hole faced east, toward the road. Habitat in the vicinity of the pole was characterized by a vineyard and farm with Christmas trees and scattered orchard trees to the west and mature riparian mixed forest, along the Tualatin River, to the east. Branches of an approximately 25-m tall Douglas-fir (*Psuedotsuga menziesii*) contacted the west side of the pole.

Red-breasted Sapsuckers, although known to drum on utility poles (Bent 1939), typically excavate nest cavities in large snags or live trees with decayed interiors (Howell 1952, Joy 2000, Walters et al. 2002). Nests in western Oregon are associated with dense midstory and understory cover in close proximity to water (Nelson 1988). New nest cavities are excavated each year, often in the same tree used in previous years (Howell 1952), and eggs are deposited on fine wood chips that are retained in the cavity (Bent 1939). Other species of woodpeckers are known to nest in utility poles causing significant damage (Dennis 1964, Harness and Walters 2004). Lower nest success occurs in recently installed, treated poles compared to more weathered, older (15 to 20 years), treated poles (Rumsey 1970).

None of the four currently recognized species of sapsuckers (AOU 1998) has previously been reported, to the author's knowledge, to nest in utility poles. This account departs from published literature on nesting habitat of sapsuckers in general, and suggests that Red-breasted Sapsuckers are more opportunistic than previously thought. Photographic documentation of the nesting pair was submitted with the manuscript.

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[1] U.S. Army Corps of Engineers, P. O. Box 2946 (CENWP-PM-E), Portland, OR 97208, USA; e-mail: steve.r.helm@usace.army.mil